

CONTRIBUTIONS TO THE OAK FLORA OF CENTRAL AMERICA

CORNELIUS H. MULLER

Recent botanical exploration in the Central American republics has emphasized the incompleteness of our knowledge of the oak flora of that region. As pointed out in "Additions to the Oak Flora of El Salvador" (Tucker, John M., and Cornelius H. Muller, *Madroño* 8: 111-117. 1945), a collection of twenty-three numbers necessitated considerable change in some of the concepts embodied in "The Central American Species of *Quercus*" (Muller, Cornelius H., U.S.D.A. Misc. Publ. 477: 1-216. 124 pl. 1942). More recently additional specimens from Honduras, Guatemala, Costa Rica, and El Salvador have revealed an unexpected wealth of information on the oaks of these countries. It had been thought that the floras of Guatemala, Honduras, and Costa Rica were fairly well known, while El Salvador and Nicaragua were admittedly poorly represented in collections.

The recent field work of Dr. Louis O. Williams and his associates (notably Antonio Molina R.) at the Escuela Agrícola Panamericana, Tegucigalpa, Honduras, has yielded some seventy-five collections of *Quercus* made in Honduras as well as a similar quantity in Guatemala and Costa Rica. It is significant that the most interesting plants were found at high elevations beyond those usually reached by earlier collectors. In Honduras the principal novelties were found in cloud forest areas on two peaks in the Departamento de Morazán, one above and southwest of San Juancito and the other on Mount Uyuca. Dr. Williams has expressed the opinion (in correspondence with the author) that it is not very likely that the collection of the oak flora of Honduras will be "even approaching completion for some years to come" because of the great number of isolated mountains that are difficult to reach.

The degree of apparent endemism exhibited by some of the cloud forest species in Honduras is truly remarkable. The two localities mentioned above occupy peaks of similar elevation (about 2,000 m.) only about twenty-five kilometers apart. On both peaks cloud forest is well developed over small areas, but only five species of *Quercus* are known to be common to the two localities, namely *Q. aáata* C. H. Mull., *Q. pacayana* C. H. Mull., *Q. eugeniaefolia* Liebm., *Q. trichodonta* Trel., and one undescribed species. In addition Mount Uyuca yielded *Q. oocarpa* Liebm., while in the San Juancito locality were found two new species. The degree of distinctness of two of the novelties is quite unusual. If equally distinct narrow endemics may be expected in similar proportions on the other peaks of cloud forest elevation, the com-

plete exploration of the Central American oak flora has only begun.

The number of novelties and significant extensions of range thus far encountered in Dr. Williams' collections seem to justify a review of the Honduran species at this time. All but six of the species previously known from Honduras are here treated. These six are *Q. Pilarius* Trel., *Q. corrugata* Hook., *Q. segoviensis* Liebm., *Q. tristis* Liebm., *Q. Skinneri* Benth., and *Q. tenuiaristata* Trel., all of them species of moderate elevations, chiefly in the Departamento de Comayagua. Included also are isolated records from Guatemala, El Salvador, and Costa Rica.

The author is deeply indebted to Dr. Williams for the privilege of studying his collections and for his generous cooperation in making repeated visits to the principal localities at the author's request.

The specimens cited are deposited in the herbarium of the author except where otherwise indicated; duplicates have been retained in the herbarium of the Escuela Agrícola Panamericana at Tegucigalpa, Honduras. Duplicate specimens of almost all of the numbers cited are to be found also in the herbaria of the Chicago Natural History Museum and the Arnold Arboretum.

SUBGEN. LEPIDOBALANUS (ENDL.) OERST.

QUERCUS INSIGNIS (?) Mart. and Gal., Bull. Acad. Brux. 10¹: 219. 1843.

This species is here tentatively reported for the first time from Honduras and Costa Rica. It has previously been described as "occasional" in the British Honduras—Guatemala boundary region and more common in the southern Sierra Madre Oriental of Mexico, whence it was originally collected in Vera Cruz. Few species of *Quercus* bridge the Isthmus of Tehuantepec, all of them the "tropical" species of the lowlands of the Atlantic slope. It is possible that the sterile specimens here cited represent some other species, but they belong to no species previously known in these areas.

HONDURAS. Dept. Comayagua: a single tree 42 m. tall, bole 1.2 m. above buttresses, along Rio Tepemechin near Lake Yojoa, altitude 600 m., August 2, 1947, *Shank 12822*.

COSTA RICA. Prov. Puntarenas: tree 27 m. with shaggy bark, Agua Buena, altitude 1100 m., January 24, 1948, *Shank 13954*.

Quercus tomentocaulis sp. nov. Arbor usque ad 80 m. alta; ramuli 2–4 mm. crassi dense fulvo-tomentosi; stipulae persistentes; folia tarde decidua, chartacea, 8–14 cm. longa, 2–5 cm. lata, oblanceolata vel anguste elliptica apice acuta basi cuneata vel rotundata crenata supra sparse villosa vel glabrata subtus villosa costis utrinque fulvo-tomentosa, venis utrinque 12–16 supra impressis subtus prominentibus; petioli 5–7 mm. longi, dense fulvo-tomentosi.

Tree to 80 m. (!) tall; twigs 2 to 4 mm. thick, coarsely fluted, densely yellow- or fulvous-tomentose, persistently gray-tomentose the second season with lenticels not evident; buds not seen; stipules persistent until the second season, 7 or 8 mm. long, ligulate or somewhat spatulate, dorsally rather densely appressed-hirsute; leaves evergreen, rather thin and chartaceous, usually 8 to 12 or sometimes 14 cm. long, 2 to 4 or 5 cm. broad, broadly oblanceolate to narrowly elliptic, cuneate to narrowly rounded or rarely broadly rounded at base, apically somewhat attenuate, regularly antrorsely crenately low-toothed except in the basal one-third, the teeth obscurely mucronate, margins somewhat crisped, moderately cartilaginous and slightly revolute (some leaves teratologically markedly revolute), upper surface dull green, sparsely villous with inconspicuous simple or few-rayed stellate hairs, promptly glabrate except the buff-tomentose midrib and the principal veins or a few hairs persistent on the blade, lower surface lighter green, persistently sparse-villous with mostly stellate hairs, especially on the veins, the midrib obviously tomentose; veins 12 to 16 on each side, very regular, branching and obviously anastomosing near the margin but ultimately passing into the teeth, somewhat impressed above but raised within the depressions, very prominent beneath (including also the reticulum); petioles 5 to 7 mm. long, densely fulvous-tomentose like the twigs and midribs; catkins and fruit not seen. (Pl. 9.)

HONDURAS. Dept. Morazán: cloud forest area, altitude 2000 m., mountains southwest of San Juancito, May 21, 1947, *Williams* and *Molina 12756* (type, in herbarium of the author; isotypes, in herbarium of the Escuela Agrícola Panamericana, Tegucigalpa); altitude 1800 m., February 20, 1948, *Williams* and *Molina 13725*; tree to 80 m. tall, rain forest, altitude 1800 m., north slope of Mount Uyuca between La Labranza, Tatunbla and Q. de Granadillo, November 4, 1948, *Molina 1431*.

COSTA RICA. Prov. Cartago: timber tree cultivated by C. H. Lankester, Las Concavas, Cartago, March 7, 1948, *Williams* and *Molina 13803*.

Quercus tomentocaulis is similar in appearance to *Q. Davidsoniae* Standl. of Panamá and Costa Rica and to *Q. insignis* of México and British Honduras. The persistently tomentose twigs and persistent stipules of *Q. tomentocaulis* readily distinguish it from *Q. Davidsoniae*. From *Q. insignis* the species is distinguished by its shorter petioles, smaller leaves with usually more prominent teeth and pointed apices, and its stipules usually persisting more than one year. The openly dispersed spreading hairs of the lower leaf surface further characterize the species. Until flowering and fruiting characters are known, it is undesirable to assign *Q. tomentocaulis* with finality to any known series of species, but a relationship to *Q. Davidsoniae* and to *Q. insignis* may be suggested.

The discovery of the several specimens of *Q. tomentocaulis* ex-

plains the baffling polymorphy ascribed to *Q. Davidsoniae* (Muller, l.c., p. 20). In keying out *Q. Davidsoniae* it was necessary to place that species under both "twigs of the season persistently and densely fulvous-tomentose" and "twigs of the season glabrate or sparingly pubescent." The type (from Panamá) falls in the latter class, but at least some of the Costa Rican specimens are persistently tomentose. These latter should probably be included in *Q. tomentocaulis* which the Honduran specimens have demonstrated to be a recognizable entity. It should be noted also that the Costa Rican material cited under *Q. Davidsoniae* included some with leaves pubescent on the veins beneath. As the specimens are not now at hand, it is not possible to say if this pubescence is correlated with the persistence of twig tomentum. However, such variations are almost universally correlated in *Quercus*. Reference to persistent pubescence of twigs and veins should be deleted from the description of *Q. Davidsoniae*.

QUERCUS OOCARPA Liebm. Overs. Danske Vidensk. Selsk. Forhandl. 1854: 184. 1854.

This is the second authentic collection of this species from Honduras, the first having been taken from the Departamento de Comayagua in 1936.

HONDURAS. Dept. Morazán: slender tree 7 m. tall, cloud forest, altitude 2000 m., Mount Uyuca, May 9, 1947, *Williams and Molina 12617*.

Quercus Molinae sp. nov. Arbor usque ad 10 m. alta; ramuli diametro 2 mm. pilis brevibus fulvo-tomentosi; stipulae persistentes; folia sempervirentia membranacea 12–21 cm. longa, 3–7 cm. lata, anguste oblanceolata apice attenuato-flagellata vel acuminata basi anguste rotundata ad apicem versus falcato-dentata utrinque costis strigosis exceptis glabrata; venis utrinque 10–14 supra impressis subtus prominentibus; petioli 2–3 mm. longi, strigosi.

Tree 10 m. tall; twigs about 2 mm. thick, obscurely fluted, persistently short buff-tomentose or sparsely so, the surface glaucous or gray; buds elongate, sparsely ciliate or glabrous, terminal buds not seen; stipules persistent, about 10 mm. long, ligulate, sparsely buff-tomentose dorsally; leaves persistent, very thin and membranous, 12 to 18 or even 21 cm. long, 3 to 5 or even 7 cm. broad, narrowly oblanceolate, very narrowly rounded at base, attenuately flagellate at apex, coarsely and falcately several-toothed above the middle, margins minutely cartilaginous and strigosely sparse-ciliate, upper surface dull green and glabrous except for the sparsely strigose midrib, the principal veins rarely strigose, lower surface similar except for occasional axillary tufts, the midrib and veins more definitely strigose; veins 10 to 14 on each side, branching and obscurely anastomosing but passing into the teeth where these are present, slightly impressed above, rather prom-

inently raised beneath; petioles 2 to 3 mm. long, strigose or dorsally glabrous and dark brown; catkins and fruit not seen. (Pl. 10.)

HONDURAS. Dept. Morazán: cloud forest area, altitude 2000 m., mountains southwest of San Juancito, May 21, 1947, *Williams* and *Molina 12753* (type, in herbarium of the author; isotypes, in herbarium of the Escuela Agrícola Panamericana, Tegucigalpa).

It is a pleasure to name this species in honor of Antonio Molina R., one of the collectors who assembled this important collection of plants.

Quercus Molinae is clearly related to *Q. aáata* but differs in the shape, thin texture, and marked tothing of its leaves and the much greater prominence of its twig pubescence. In general appearance *Q. Molinae* is much like *Q. Pilarius* Trel., but it is amply distinguished from that species by its exceedingly thin leaf blades with midribs and veins clearly strigose even in age and its persistently appressed tomentose twigs. From *Q. oocarpa* the new species may be distinguished by its entirely glabrate lower leaf surface, its less copious pubescence, and its narrower leaves with attenuate apices.

The excessively attenuate development of the leaf apices forms "drip tips" in *Q. Molinae* even more pronounced than those described in *Q. esesmilensis* (Tucker and Muller, l.c., p. 117) and clearly bears out the collectors' designation of the habitat as "cloud forest".

QUERCUS COPEYENSIS C. H. Mull., U.S.D.A. Misc. Publ. 477: 30. 1942.

Although *Q. copeyensis* has previously been known only from Costa Rica and Panamá, the species may now be recorded from Honduras. The Honduran material greatly clarifies the specific limits of the species by offering mature fruit and by exhibiting variations in leaf size and shape that clearly link to this species some anomalous specimens from Costa Rica that were reluctantly referred to *Q. aáata* (Muller, l.c., p. 27, 28, pl. 25).

In a recent paper, Little (Carib. For. 9: 345-353. 1948) called attention to these atypical specimens of *Q. aáata* and suggested their transfer to *Q. copeyensis*. He further offered an emended description of *Q. copeyensis* to accommodate the large-leaved form. The removal of these specimens from *Q. aáata* leaves that species homogeneous in form from Guatemala to Costa Rica, while their inclusion in *Q. copeyensis* is easily justified by the large series of specimens now available.

HONDURAS. Dept. Morazán: tree 8 (15) m. tall, cloud forest area, mountains southwest of San Juancito, altitude 2000 m., May 21, 1947, *Williams* and *Molina 12759*; November 6, 1947, *Williams* and *Molina 13342, 13344, 13357*; February 20, 1948, *Williams* and *Molina 13697*; tree 20 m., cloud forest on Mount Uyuca, altitude 2000 m., August 7, 1947, *Molina 465*.

COSTA RICA. Prov. Alajuela: Palmira, June 11, 1941, *Smith 2756*; July 1, 1941, *Smith 2879*. Prov. Heredia: Cerro de las Caricias, north of San Isidro, March 11, 1926, *Standley and Valerio 52178*. Prov. Cartago: tree 6 × 120 ft., dominant of temperate rain forest, altitude 8300 ft. along the continental divide, Cordillera de Talamanca, 36 mi. south of Cartago, February 16, 1943, *Little 6002, 6004, 6008*; tree 8 m. tall, in barranco, altitude 2800 m., slopes of Volcán Irazú, near San Rafael de Cartago, March 14, 1948, *Williams and Molina 13845*; tree 25 m. tall, altitude 2900 m., slopes of Volcán Irazú near Hotel Roberts, March 14, 1948, *Williams and Molina 13854*.

QUERCUS AÁATA C. H. Mull., U.S.D.A. Misc. Publ. 477: 27. 1942.

One collection of *Q. aáata* from the vicinity of San Juancito, Honduras, was made in 1932.

HONDURAS. Dept. Morazán: tree 5 m. tall, cloud forest, altitude 2000 m., Mount Uyuca, May 9, 1947, *Williams and Molina 12634*; tree 8 to 30 m. tall, cloud forest area, altitude 2000 m., mountains southwest of San Juancito, May 21, 1947, *Williams and Molina 12758, 12782, 12796*; March 25, 1948, *Williams and Molina 13770, 13974, 13975, 13985*.

QUERCUS POLYMORPHA Schl. and Cham., *Linnaea* 5: 78. 1830.

This species has not previously been reported south of Guatemala where it is rather widespread but apparently not abundant. Its greatest development occurs in central and northeastern México.

HONDURAS. Dept. Morazán: tree to 20 m., in canyon, altitude 1000 m., between Talanga and Izotes, April 1, 1947, *Williams and Molina 12278*.

QUERCUS OLEOIDES Schl. and Cham., *Linnaea* 5: 79. 1830.

Although frequently collected in Honduras, this species has not previously been encountered in the Departamento de Morazán. It is quite common in Honduras in dry valleys and on dry hills, principally between 800 and 1000 m. elevation. The species is a fair indicator of elevation, although it occurs both above and below the altitudes mentioned.

HONDURAS. Dept. Morazán: tree 4 to 10 m. tall, dry rocky hillside, altitude 850 m., oak-pine forest 2 km. northwest of Zamorano, July 19, 1946, *Williams and Molina 10046 and 10054*; tree 15 m. tall, along San Antonio road, October 21, 1946, *Shank 10782*; tree 5 m. tall, pine-oak forest, altitude 1200 m. at Agua Amarilla, December 1, 1946, *Williams and Molina 11030*.

SUBGEN. ERYTHROBALANUS (SPACH) OERST.

QUERCUS HONDURENSIS Trel., *Mem. Nat. Acad. Sci.* 20: 140. 1924.

This species is widely distributed in Honduras but is here re-

ported for the first time from the Departamento de Morazán, where the collectors inform me it is very common at about 1000 to 1500 m. elevation.

HONDURAS. Dept. Comoyagua: tree 5 m. tall, pine forest, altitude 1400 m., mountains above Flores, April 8, 1947, *Williams* and *Molina 12301*. Dept. Morazán: tree 15 m., pine-oak forest, altitude 1500 m., near Hoya Grande, August 17, 1947, *Williams* and *Molina 13275*.

QUERCUS YOROENSIS Trel. in Yuncker, Field Mus. Publ., Bot. Ser. 9: 282. 1940.

This species was reduced to synonymy under *Q. hondurensis* (Muller, l.c., p. 49) because the single collection upon which the typical form of *Q. yoroensis* was based seemed to be only a leaf variant of *Q. hondurensis*. *Quercus yoroensis* var. *aguana* Trel. in Yuncker (l.c.) was likewise based upon a single collection and exhibited a leaf shape more similar to *Q. hondurensis*. This seemed to add weight to the conclusion of synonymy. An additional four collections taken at some distance from the type locality and exhibiting quite constantly the differences upon which *Q. yoroensis* may be distinguished from *Q. hondurensis* make their separation imperative.

The relationship of *Q. yoroensis* to *Q. hondurensis* is obvious in the small annual fruit, the persistently tomentose twigs, and the similar arrangement of the leaf pubescence in the two species. However, the smaller, broadly rounded leaves of *Q. yoroensis* consistently distinguish that species from *Q. hondurensis*.

HONDURAS. Dept. Morazán: tree 5-10 m., oak-pine forest, dry rocky hillside, altitude 850 m., 2 km. northwest of Zamorano, July 11, 1946, *Williams* and *Molina 10047*; July 19, 1946, *Williams* and *Molina 10069*; tree 10 m., pine-oak forest, altitude 1500 m., near Lo de Ponce, February 20, 1948, *Williams* and *Molina 13745*. Dept. El Paraíso: tree 5 m., pine-oak forest, altitude 1400 m., in vicinity of Manzaragua, April 4, 1948, *Williams* and *Molina 14006*.

QUERCUS SAPOTAEFOLIA Liebm., Overs. Danske Vidensk. Selsk. Forhandl. 1854: 185. 1854.

Typical specimens of this species are not common among Honduran collections. The species has previously been reported but once from the Departamento de Morazán, although it is said to be quite abundant in some places there.

HONDURAS. Dept. Comoyagua: tree 5 m. tall, pine forest, altitude 1400 m., mountains above Flores, April 8, 1947, *Williams* and *Molina 12300*; tree 15 m. tall, altitude 870 m., slopes of mountain above Flores, April 8, 1947, *Williams* and *Molina 12310*. Dept. Morazán: tree 3 to 15 m. tall, rocky slopes, altitude 1550 m., in oak-pine forest near Hoya Grande, July 14, 1946, *Williams* and *Molina 10039*; tree 10 m. tall, altitude 1500 m., in oak-pine woods above Hoya Grande, May 11, 1947, *Williams* and *Molina 12668*.

QUERCUS AMISSAELOBA Trel. in Yuncker, Field Mus. Publ., Bot. Ser 17: 357. 1938.

In an earlier treatment (Muller, l.c., p. 53) this species was reduced to synonymy under *Q. sapotaefolia* on the basis of its being a stump-sprout or a juvenile form with "scarcely two leaves of the same size and shape". The collection of identically the same polymorphic form at some distance from the type locality and the evidence of maturity and fruition observed by the collector require a reversal of that opinion. The irregular form of the leaves, their obscure lobing, and their usually acute apices serve to distinguish this species from *Q. sapotaefolia* to which it is obviously closely related. The species is quite common in oak-pine woods. It is a fair indicator of elevation.

HONDURAS. Dept. Morazán: slender tree to 15 m. tall, dense pine forest, altitude 1300 m., near Agua Amarilla, December 8, 1946, *Williams* and *Molina* 11168.

QUERCUS EUGENIAEFOLIA Liebm., Overs. Danske Vidensk. Selsk. Forhandl. 1854: 185. 1854.

This species has not previously been known north of Costa Rica. It is quite common in cloud forests in the Departamento de Morazán where, because of its great size and abundance, it is outstanding.

HONDURAS. Dept. Morazán: tree 5 to 10 m. tall, cloud forest, altitude 2000 m., Mount Uyuca, July 8, 1946, *Williams* and *Molina* 10018; May 9, 1947, *Williams* and *Molina* 12635; tree 35 m. tall, cloud forest, altitude 2000 m., mountains southwest of San Juan-cito, May 21, 1947, *Williams* and *Molina* 12733; November 6, 1947, *Williams* and *Molina* 13336 and 13354; February 20, 1948, *Williams* and *Molina* 13702; March 25, 1948, *Williams* and *Molina* 13779; tree 10 m. tall in oak-pine forest on La Montañita, altitude 1800 m., June 7, 1947, *Molina* 40.

QUERCUS BORUCASANA Trel., Mem. Nat. Acad. Sci. 20: 161. 1924.

This species has been known previously only from Costa Rica where it is confined to elevations above 1800 m. It may now be reported from Guatemala where it grows at elevations above 2100 m. The recurrence in Guatemala of the clearly typical form of *Q. borucasana* aids materially in maintaining this problematic species.

GUATEMALA. Dept. Zacapa: tree 30 to 40 ft. tall, near summit of Volcán Gemelos, Sierra de las Minas, January 26, 1942, *Steyermark* 43300 (Herb. Chicago Nat. Hist. Mus.). Dept. Huehuetenango: cloud forest on Cerro Canana, between Cuchumatanes and Canana, Sierra de los Cuchumatanes, July 18, 1942, *Steyermark* 49034 (Herb. Chicago Nat. Hist. Mus.).

QUERCUS CRISPIFOLIA Trel., Mem. Nat. Acad. Sci. 20: 147. 1924.
This imperfectly known species is at present represented by

fragmentary type material from Chiapas, Mexico, and sterile collections from Guatemala. Extension of the range to El Salvador was anticipated (Muller, l.c., p. 32) on the basis of the reference of *Q. amphioxys* Trel. to synonymy under *Q. crispifolia*. Additional material from El Salvador strengthens the opinion that only one species is involved.

EL SALVADOR. Dept. San Salvador: western slopes above Finca Florencia, altitude 1680 to 1890 m., Volcán San Salvador, January 31, 1946, *Carlson 412* (Herb. Univ. Calif. ex Field Museum); from Finca Las Brumas, altitude 1680 m., to the peak of the volcano, altitude 2010 m., Volcán de San Salvador, February 3, 1946, *Carlson 486* and *487* (Herb. Univ. Calif. ex Field Museum).

QUERCUS TRICHODONTA Trel. in Yuncker, Field Mus. Publ., Bot. Ser. 17: 358. 1938.

This species was placed in synonymy under *Q. Skinneri* (Muller, l.c., p. 69) because the only known collection appeared to differ from typical *Q. Skinneri* only in its shorter petioles. Such a form occurs sporadically in the Mexican population of the species where it had been separated as *Q. chiapasensis* Trel. Several additional collections from Honduras now clearly indicate that *Q. trichodonta* is not merely a sporadic phenotype of *Q. Skinneri* and that it deserves specific rank. In addition to its leaf shape and short petioles, *Q. trichodonta* differs from *Q. Skinneri* in its tardily glabrate or persistently fulvous-tomentose twigs, petioles, and midribs and in its much smaller fruit maturing in one year. These characters were not evident in the type collection of *Q. trichodonta*.

The rather full series of specimens now at hand clearly connects *Q. gracilior* C. H. Mull. (l.c., p. 77) with *Q. trichodonta* under which it must be reduced to synonymy. The range of *Q. trichodonta* extends from 1000 to 2000 m. in elevation, a considerably greater difference than is ordinarily tolerated by *Quercus* species at this latitude.

HONDURAS. Dept. Morazán: tree to about 75 m., rain forest, altitude 2000 m., Mount Uyuca, August 20, 1946, *Williams and Molina 10392*; December 5, 1946, *Williams and Molina 11143a*; March 2, 1947, *Williams and Molina 12101*; May 9, 1947, *Williams and Molina 12636*. Dept. Santa Barbara: Montaña Santa Barbara, near Lake Yojoa, above Sauce, altitude 1000 m., August 7, 1948, *Williams and Molina 14521*. Dept. Comayagua: tree to 20 m., broad-leaf forest in barranco, altitude 1200 m., near Trincheras, April 30, 1947, *Williams and Molina 12550*.

QUERCUS ACATENANGENSIS Trel., Mem. Nat. Acad. Sci. 20: 163. 1924.

Although very abundant through much of Guatemala, *Q. acatenangensis* has not previously been reported from the Departamento de Sololá.

GUATEMALA. Dept. Sololá: tree 6 m., moist banks below Los Encuentros, altitude 2500 m., June 25, 1947, *Williams 13149*.

Quercus Lowilliamsi sp. nov. Arbor usque ad 40 m. alta; ramuli diametro 2-3 mm. pilis flavidis primo stellato-tomentosi demum glabrati; stipulae caducae; folia decidua coriacea 12-23 cm. longa, 3-6 cm. lata, anguste oblanceolata basi cuneata apice attenuato-acuta aristataque integra vel ad apicem versus aristatodentata domatiis exceptis glabrata; venis utrinque 12-15 paulo prominentibus; petioli 7-12 mm. longi, glabrati; fructus annuus brevipedunculatus; cupula 12 mm. lata; squamae stricte appressae; glans 12 mm. longa, 10 mm. lata, subrotunda quarto longitudine in cupula inclusa.

Tree 40 m. tall; twigs 2 to 3 mm. thick, coarsely fluted, densely fulvous-tomentose, quickly glabrate or tardily so about the apex or in protected grooves, dull brown with inconspicuous lenticels, becoming russet the second season with numerous small prominent pale lenticels; buds tan-brown, fulvous-tomentose about the apex, otherwise glabrous and glossy (mature buds not seen); stipules promptly caducous; leaves deciduous, rather thick and coriaceous, 12 to 18 or even 23 cm. long, 3 to 5 or 6 cm. broad, narrowly oblanceolate, narrowed at both ends, basally cuneate or rarely narrowly rounded, attenuately acute and aristate at apex, aristately few-toothed about the apex or quite entire, upper surface dull dark green and glabrous, lower surface light green and glossy, glabrate except for tufts of fulvous tomentum in the axils of the principal veins, margins minutely cartilaginous; veins 12 to 15 on each side, sometimes with evanescent intermediates, branching widely and obviously anastomosing toward the margin, somewhat raised on both surfaces (including the reticulum) but quite prominent beneath; petioles 7 to 12 mm. long, at first fulvous-tomentose but soon glabrous like the twigs, dorsally flattened and winged by the decurrent blade; staminate catkins 3 to 4 cm. long, loosely flowered on a loosely tomentose peduncle, the anthers much exerted from the villous calyx; pistillate catkins densely fulvous-tomentose, 2- or 3-flowered on peduncles 5 or 10 mm. long, the young cups subcylindric, the scales densely fulvous-tomentulose; fruit annual, solitary or paired on stout peduncles about 3 mm. long, small; cups about 12 mm. in diameter, goblet-shaped with obviously constricted bases, scales tightly appressed, minutely gray-tomentulose except the strict brown glabrous margins; acorns about 12 mm. long, 10 mm. broad, subrotund, at first minutely silky-pubescent, tardily glabrate, light brown, about one-fourth included. (Pl. 11.)

HONDURAS. Dept. Morazán: cloud forest area at 1800 to 2200 m. altitude in mountains southwest of San Juancito, May 21, 1947, *Williams and Molina 12760* (type, in herbarium of the author; isotypes in herbarium of the Escuela Agrícola Panamericana.



PLATE 9. QUERCUS TOMENTOCAULIS MULLER (WILLIAMS AND MOLINA 12756).